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Churches Influenced by Underground Mining in the Karvina Region Used for the Purposes of Geotourism

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Abstract

The article aims to point out the mutual relations between underground mining and its manifestations on the ground surface. For the purpose, churches in the Karviná Region were selected. The buildings have been affected by over 200-year long extraction of hard coal. Some of the buildings have been influenced from the start of the mining activities, others later on. Thanks to the combined effects of the historical significance of the monuments and their diversion from the vertical axis, the buildings have become even more interesting. Moreover, they clearly document how the anthropogenic mining activities influence the built-up area. Some of the buildings have been preserved to date, some had to be demolished, unfortunately. Nowadays, the monuments are becoming significant sites of geotourism interest.

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Keywords: underground mining, coal, churches, conservation of monuments, geotourism, Karviná Region, Czech Republic

1. Introduction

Underground coal mining has had a long history in the Ostrava and Karviná regions. The significance of coal mining for the region has been substantial from the economic point of view. Especially in the past, coal mining gave jobs to many thousands workers, who have extracted huge volumes of the mineral resource to date. However, the disruption of the rock massif, where extraction was or has been carried out, has its adverse effects too. Due to undermining, various phenomena have appeared that have considerably affected the built-up area in the agglomeration. Under some important sites, mining was not carried out because of prevention. On the other hand, other sites have been affected fundamentally. Nowadays, mining continues in the Karviná Region, and the manifestations of mining are clearly visible on the ground surface. For example, common are problems with railway superstructures, roads repairs or demolition of statically disturbed structures. Many structures and buildings have been sacrificed due to the mining influences, and sometimes town quarters or whole towns were demolished. Churches, sometimes as single buildings,

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have been preserved and they thus serve as evidence of the extent of the original settlements. The combination of the current landscape with the preserved relics of the original architecture, especially churches, and the on-going extraction of hard coal is suitable for geotourism purposes. The world-wide success of this form of tourism has been discussed in many works and studies. Specific localities and the questions concerning geotourism are closely described in [1, 3, 4, 6, 8, 9, 14, 24, 27].

2. Geological structure of the studied locality

The Karviná part of the Ostrava-Karviná Coal District, which is the economic name used for the basin, pertains to the Czech part of the Upper Silesian Basin. The Upper Silesian Basin stretches on an area of almost 7 000 km^2, where its larger part belongs to Poland and its smaller one (1 550 km2) falls into the territory of the Czech Republic. The geological structure of the Upper Silesian Basin has been studied practically from the start of mining. Some recent works [2, 5, 11, 12, 16, 19] have provided many complementary data of an interdisciplinary character. Still, the exact extent of the concerned basin part is unknown as the southern border is not definite. This is caused by the fact that the deposit is sunk under overthrusts. From the deposit point of view, important for mining are the Carboniferous seams of the Ostrava Formation and Karviná Formation. The Ostrava Formation formed during the Lower Namurian in the littoral conditions. There are maritime, fluvio-marine and fresh-water sediments with preserved fauna. The Karviná Formation began to sediment after a strata gap from the Middle Namurian to Westphalian (Langsettian). The sedimentary environment is continental and lacustrine. The seams of the formation are divided into Saddle, Suchá (Lower and Upper) and Doubrava Members (Doubrava s.s. and Upper Doubrava). The Ostrava Formation developed in the Czech part of the Upper Silesian Basin almost along its overall area and its total thickness is almost 3 000 m. The Karviná Formation extends into the regions of Karviná, Frenštát and Jablunkov. Its thickness reaches 1 300 m. The seam thickness in both the formations falls in the direction of south-east. The mean seam thickness in the Ostrava Formation is 0.7 m and in the Karviná Formation it is 1.8 m. The highest thickness occurs in Seam 504 (Prokop), which makes part of the Karviná Formation, and in places it exceeds 10 m. The inconsistency of the seam development and their spatial variations reflect in their number estimate. In total, the coal district keeps a record of around 415 seams of diverse thickness, out of which around 140 were classified as mineable in the past. The Karviná Formation, which underwent an intense exploitation in the past, had 55 seams. The productive Carboniferous outcrops in few small rock exposures in the Ostrava-Karviná Ridge. There are Tertiary and Quaternary sediments in the overlying strata of the Carboniferous.

3. Brief history of Karviná

The district spreads on area of 360 km^2 and falls into the Moravian-Silesian Region. The district includes the following towns: Bohumín, Český Těšín, Havířov, Karviná, Orlová, Petřvald and Rychvald. The localities, where the churches are situated, make parts of towns and municipalities. The first locality is Karviná-Doly. Until the start of the 19th century it was an agricultural village. The first mentions date back into the 13th century. In 1923 it became the town of Karviná and nowadays, Karviná-Doly is a part of Karviná. The locality of Karviná-Louky used to be a village called Louky nad Olší, from which only a small torso has remained. The first documented mentions about the village are from 1447. The third locality is the municipality of Doubrava. The mentions about the original settlement date back to 1229. Orlová used to be an important Silesian town. Originally an agricultural village, Orlová became to develop dynamically due to coal mining and in 1922 it became a town. Apart from mining, other forms of industry developed there. After the Second World War the town went into recession. The original redevelopment plans of the whole town did not take place. From the original town, the redevelopment concerned only 2 000 premises. Only a torso has remained, which is being revitalised at present. The passenger railway transport and tram transport were also terminated. Schools, historically the most important in the region, were moved into other towns. The town museum was closed and the chateau was redeveloped. The first mention on the municipality of Stonava appeared in 1388. At the start and many years after coal mining boosted the economic growth in the region. The coal extraction has lasted there for over 200 years. In the courses of the centuries, the mines had various owners, who did not always opt for suitable mining methods. The consequences of such activities have markedly manifested in the region and complicated

its further development. The information on the actual appearance of the original settlements may be obtained from contemporary pictures and some scientific works [7, 25, 26].

4. Selected churches for the geotourism purposes

As for churches we select premises, on which underground mining has left the most marks. The subsidence basin, formed in the region, has influenced the structures in an immense manner. The buildings have tilted away from the vertical axis, and there are frequent cracks in the walls. This article orders the churches from the one with the most prominent tilt to the lowest one. Due attention has been paid to the study of the geological manifestations on the Earth´s surface. For example, the issue is discussed in many recent works by [10, 13, 15, 17, 18, 20, 21, 22, 23, 28, 29].

Locality 1 – Karviná-Doly: Church of St. Peter of Alcantara

On the foundations of a derelict wooden church, the nobleman F. W. Larisch had a Baroque church built in 1736, which was dedicated to St. Peter of Alcantara. In 1759 the church was consecrated by the bishop F. G. Schaffgotsch from Vratislav. It is a single-nave church building with a semi-circular chancel. The tetrahedral tower had to be lowered twice in the past. In the 19th century it was rebuilt in the Classicist style and had to be lowered due to undermining. Having been disturbed by a gale in the 1950s it was lowered the second time. Nowadays, the building is 17.5 m tall and 12 m wide. The prolonged mining under the building, from where several tens of metres of coal seam thickness were extracted, naturally must have manifested on the ground surface. The measurements show that the church sank by about 37 m and it tilted by almost 7° in the southern direction. Therefore, the building is being referred to as 'Czech Pisa'. Interesting is also the fact that the differentially settling terrain caused that the adjoining cemetery is currently placed higher than the church itself. In the 1990s the church was supposed to be demolished, but finally it was saved in the last moment. The redevelopment measures using grouting and steel rods at different height levels have stabilised the building. Two adjoining tombs were also restored and the surroundings were reclaimed. At the turn of the millennium the church was re-consecrated. In 2012 plasters were repaired and the problems with water in the masonry were solved. Two new bells were also hung there, where the larger is called after the patron of the formerly neighbouring Church of St Henry, which was demolished due to undermining in 1960. Such preserved monuments are the reminders of old Karviná.

Locality 2 – Karviná-Louky: Church of St. Barbora

The original municipality Louky nad Olší was much disturbed by mining. Originally a flat region has subsided considerably as a result of undermining. Such manifestations may be observed during train journeys because significant subsidence requires modifications of the railway superstructures. The church, dedicated to the patron of miners – St Barbora – is currently in serious disrepair. The tilt from the vertical axis is 1°42´. The building has a vertical crack along its whole height. On the place of the church there used to be a wooden evangelical church of the Těšín Parish, which had been built on the turn of the 15th and 16th centuries. Supported by the Emperor Josef II., the municipality obtained finances to establish its own parish. Thanks to this, a new church was built between 1809 and 1818. The church is a single-nave building with a tetrahedral tower, saddle roof and semi-circular chancel. The authorship is attributed to an architect from Opava, A. Englisch. The original façade from the Late Baroque with the subsequent Classicist style was replaced by 'brizolit¨, i.e. a kind of exterior finish. The interior was decorated by paintings from the 19th century. It was used for the church purposes until 1995, when it was desacrated. At present it is dilapidated, also due to frequent changes in ownership. It was removed from the list of cultural monuments, and if this trend is not reversed, the church will fall apart. A new replacement church was built elsewhere, and dedicated to the same patron. It is a building, designed by an architect, L. Mirt, active in Slovakia, and it was consecrated in 2001. It has a shape of a tear to symbolize the sorrow over the devastated landscape due to coal mining and human indifference.

Locality 3 – Doubrava: Hussite church of the Czechoslovak Hussite Church

After the chateau and the Statue of St John of Nepomuk, it is the third cultural monument in the municipality. The church was inaugurated for the Hussite Church on 4 November 1928. The designer was the local developer Čeněk Volný, who was also responsible for the construction. The building has an iron-concrete lining construction. It is an undirected, single-nave building with a rectangular ground plan. Reconstruction was carried out in the 1990s and the building was declared a cultural monument. The vertical tilt is 1°36´.

Locality 4 – Orlová: Evangelical church

The church of the Evangelical Church of the Augsburg Confession belongs to the well preserved landmarks of the town. It is situated near the historical centre. It was built by Josef Gros of Těšín. The church was consecrated and opened in 1862. The building has the style of Late Romanticism-Classicism. It is a single-nave structure with an interesting steeple that contains three bells from 1918. The façade has a pronounced horizontal structure and a saddle roof. The alter is placed in a polygonal, enclosed presbytery. It was declared a cultural monument in 2001. The building has been significantly influenced by mining and had to undergo several reconstructions, including static measures. The masonry shows fine and disconnected fissures. The measured vertical tilt is 1°18´.

Locality 5 – Doubrava: Church of St. Hedwig of Silesia

Works on this Neo-Romanesque church began in 1894. The architect and developer was Bedřich Fulda of Těšín. The structural works finished in 1896 and the finishing works continued to 1898, when the church was consecrated. The structure was strengthened by metal columns and H-beams. The church is a single-nave building with a presbytery. Above the sacristy, above which there are two oratories, two cylindrical needle-like towers start. The façade originally had a tall bossage. The look of the church is the result of past reconstructions, where the major ones took place between 1987 and 1988. It is possible to observe the effects of undermining and the occurrence of a drainless depression. The vertical tilt is 1°.

Locality 6 – Stonava: Evangelical church

Extensive mining activities and demolitions after the Second World War significantly interfered with the municipality development. Among the few original and preserved buildings there are also two churches. The evangelical church with Neo-Gothic elements was built in 1938. It was built by means of self-help by local developers. As for dimensions, it is 18 m long and 10.5 m wide. Mining influence has manifested by the tilt from the vertical axis of 0°34´. The last reconstruction occurred in autumn 2013.

Locality 7 – Stonava: Church of St. Mary Magdalene

The church was a replacement of an original wooden church (1779 – 1913), which had been situated at the place of the current Catholic cemetery. The church was built between 1906 and 1910 by the developer Hugo Königsberger. The structure has a coarse masonry in the Neo-Gothic style. In 1992 the church was classified on the list of cultural monument list. In the 1990s the church was completely redeveloped. The foundations were fortified, the whole structure was fixed and the manifestations of the mining influence were effaced (cracks were repaired and paintings restored). The current vertical tilt is 0°30´.

Locality 8 – Orlová: Church of the Nativity of Virgin Mary

The second church in Orlová affected by mining is a building from 1906. There used to be a monastery with a monastery church of 1223. After various modifications, the complex closed down and a Late Baroque chateau, which does not exist any longer, was built on the site. The current church was erected on the foundations of the original church and its older constructions were also used. It is a triple-nave, two-tower monumental Neo-Gothic building. It is situated over the former old town square. The church is complemented by an access staircase with statues, walls and the premises of the chateau park. Extensive restoration and stabilisation works have begun in 2003. The current vertical tilt is 0°3´.

5. Conclusion

The area under description has been greatly affected by mining. Only certain premises have been preserved out of some of the earlier developing and thriving towns and municipalities. In the majority of cases, the only preserved premises are churches, but their future is not certain. The mining influence has left its marks on their stability. Some of the buildings have been repaired and statically secured. Others were not so lucky. If they are not reclaimed, they may disappear completely. A good example of a saved unique church is the Church of St. Peter of Alcantara. Due to the applied static safety measures and reconstruction, the church still serves its original purpose and is an important monument. The redevelopment measures were agreed on only shortly before its preservation. The other churches found in the subsidence basin are in various degrees of damage. The set of churches described herein includes churches built in different historical periods. There are situated within a small area and may be a perfect example of a locality for geotourism purposes. The locality may be admired for the long-term effects of mining on the landscape from different points of view and interests. One of them may be the mining impact on the structures.

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